DRAFT

RAPID RESPONSE ACTION FIELD SAMPLING PLAN

FOR THE
CAMP EDWARDS IMPACT AREA GROUNDWATER QUALITY STUDY

MASSACHUSETTS MILITARY RESERVATION
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DRAFT RAPID RESPONSE ACTION FSP

1.0 Introduction

This Rapid Response Action (RRA) Field Sampling Plan has been prepared pursuant to Appendix A in EPA Docket No. SDWA-1-2000-0014, also referred to as Administrative Order #3 (AO3). This administrative order specifies that a series of rapid response actions and remedial actions be implemented to be protective of groundwater at the Massachusetts Military Reservation (MMR) Camp Edwards Training Site. This Field Sampling Plan (FSP) also provides information to support implementation of a Release Abatement Measure (RAM) Plan as specified in the Massachusetts Contingency Plan (MCP) regulations 310 CMR 40.0444. For the purposes of this FSP, the term RRA will collectively refer to the Rapid Response Actions under AO3 and to the RAM under the MCP.

The RRA FSP addresses the additional soil sampling proposed in the Rapid Response Action Workplan (Ogden, 2000). The sampling program, as summarized in Section 2, is being conducted to delineate areas of soil within four AOCs that exceed the proposed cleanup standards. These AOCs are:

- Area 2: Study Area 2 of the Impact Area.
- Area 23: J-3 Wetland.
- Area 44: KD Range firing points and target areas.
- APC Area.

2.0 Scope of Investigation

In the following sections, a brief scope of work and rationale for the proposed sampling program are outlined for each AOC proposed in the RRA Workplan. The soil sampling results that are discussed in these sections are from the Phase I and/or Phase IIa sampling programs. Cleanup standards for the various compounds are background levels established for the site (Ogden, 2000). Table 2-1 presents a summary of the soil sampling program.

2.1 Area 2

EDB – Area 2 and the 1,2-dibromethane (EDB) analytical results from previous sampling are summarized in Figure 2-1. VOC analytical results for the discrete sample collected at grid point 5 (center point of a nine-point grid) from soil grid 02J at the 0 - 0.5 ft depth in

Area 2 showed a concentration of EDB of 190 J ug/kg. This concentration of EDB exceeds the proposed cleanup standard for EDB of 5 ug/kg. There were no detections of EDB in the 1.5 - 2.0 ft sample.

This location will be resampled at the 0 - 0.5 ft depth and analyzed for EDB (Method 8021) to confirm the analytical results. If EDB is detected in excess of the cleanup standard, four additional discrete soil samples will be collected from 0 – 0.5 ft from four grids surrounding soil grid 02J.

2.2 Area 23: J-3 Wetland

Explosives - Area 23 and the explosives analytical results from previous sampling are summarized in Figure 2-2. Explosive analytical results for soil samples collected at 23B showed detections of nitroglycerine (NG) at 0 - 0.5 ft (3200 NJ ug/kg) and 1.0 - 1.5 ft (5200 ug/kg) in excess of the proposed cleanup standard of 2500 ug/kg. NG was also detected in excess of the cleanup standard in the soil sample collected at 0 - 0.5 ft at 23H (3100 J ug/kg).

To verify the southern extent of NG detections at 0 – 0.5 ft, a discrete soil sample will be collected at this depth 10 feet southeast of the 23H location and analyzed for explosives. The vertical extent of NG at the 23B location will be assessed by collecting a discrete soil sample at 1.5 – 2.0 ft and analyzing the sample for explosives (Method 8330). As a contingency, two discrete samples are planned to further delineate the horizontal or vertical extent of NG, depending on the analytical results from the proposed locations.

Pesticides – Area 23 and the pesticide analytical results from previous sampling are summarized in Figure 2-3. Pesticide analytical results for several discrete soil samples collected around the J-3 Wetland showed detections of dieldrin. Dieldrin was detected above the proposed cleanup standard of 246 ug/kg in soil collected from 0 – 0.5 ft at 23I (400 ug/kg).

The horizontal extent of dieldrin will be assessed by collecting two discrete samples at two locations, one east and one south of 23I, from 0 – 0.5 ft. The vertical extent of dieldrin at 23I will be assessed by collecting a discrete soil sample at this location from 1.5 – 2 ft. Samples will be analyzed for pesticides (Method OLM3.1).

2.3 Area 44: KD Range

Five areas on the KD Range are included the RRA Workplan: Primary Target area, TOW Firing Point, 90mm Firing Point, Rocket Firing Point, and Dragon Firing Point.

2.3.1 Primary Target Area

Explosives - Area 44 and the explosive analytical results from previous sampling are summarized in Figure 2-4. Soil sampling around the Primary Target area consisted of sampling four soil grids (44L, 44M, 44N, 44O) positioned around each side of the target. Samples were collected from 0 – 0.25 ft, 0.25 – 0.5 ft and 0.5 – 1.0 ft. Explosive analytical results showed that RDX, TNT, HMX and NG were detected in concentrations above cleanup standards in samples from one or more of the grids 44L, 44M, and 44N at 0 – 0.25 ft. For the 0.25 – 0.5 ft samples, the cleanup standards were exceeded for RDX at soil grid 44N and for NG at soil grid 44M. The proposed soil cleanup standard for RDX is 120 ug/kg and 2,500 ug/kg for NG.

To assess the horizontal extent of explosives in the Primary Target area at 0 – 0.5 ft, composite soil samples will be collected from eight grid locations surrounding the 44L, 44M, 44N, and 44O grids. In addition, composite soil samples will be collected from 0.5 – 1.0 ft at the three grid locations surrounding each of the two grids 44N and 44M to assess the horizontal extent of explosives at this depth. To assess the vertical extent of explosives, composite soil samples will be collected at 1.5 – 2 ft at 44N. All samples will be analyzed for explosives (Method 8330).

A contingency of nine composite soil samples at nine grid locations is planned depending on the results of the initial sampling.

Metals - Area 44 and the metals analytical results from previous sampling are summarized in Figure 2-6. Metals analytical results showed that copper and lead were detected. An agreed upon soil cleanup standard for the metals has not been reached at this time. Therefore, it is unclear whether the copper and lead levels exceed any cleanup standards. In the absence of a metals cleanup standard, metal samples will be collected at the same location as the explosive samples discussed in the proceeding section. The samples will be held for analysis pending the outcome of the soil cleanup standard discussions with the regulatory agencies. Metals have a six-month holding time for analysis.

2.3.2 TOW Firing Point

Explosives - Area 44 and the explosive analytical results from previous sampling are summarized in Figure 2-4. Soil sampling around the TOW Firing Point consisted of sampling two soil grids (44F and 44G) positioned on either side of the firing point. Soil samples were collected from 0 – 0.25 ft, 0.25 – 0.5 ft and 0.5 – 1.0 ft. Explosive analytical results showed that NG was detected in excess of cleanup standard in the 0 – 0.25 ft samples (3200 J – 40,000 ug/kg).

To assess the horizontal extent of explosives at the TOW Firing Point at 0 – 0.5 ft, composite soil samples will be collected from six grid locations surrounding the 44F and 44G grids. All samples will be analyzed for explosives (Method 8330).

A contingency of ten composite soil samples at ten grid locations is planned depending on the results of the initial sampling.

Metals - Area 44 and the explosive analytical results from previous sampling are summarized in Figure 2-6. Metals analytical results showed that copper and lead were detected. An agreed upon soil cleanup standard for the metals has not been reached at this time. Therefore, it is unclear whether the copper and lead levels exceed any cleanup standards. In the absence of a metals cleanup standard, metal samples will be collected at the same location as the explosive samples discussed in the proceeding section. The samples will be held for analysis pending the outcome of the soil cleanup standard discussions with the regulatory agencies. Metals have a six-month holding time for analysis.

2.3.3 90mm Firing Point

Explosives - Area 44 and the explosive analytical results from previous sampling are summarized in Figure 2-4. Soil sampling around the 90mm Firing Point consisted of sampling two soil grids (44T and 44U) positioned on either side of the firing point. Soil samples were collected from 0 – 0.25 ft, 0.25 – 0.5 ft and 0.5 – 1.0 ft. Explosive analytical results showed that NG was detected in excess of the cleanup standard in the 0 – 0.25 ft sample at 44T (13,000 J ug/kg) and at the 0.25 – 0.5 ft sample at 44U (2900 J ug/kg).

To assess the horizontal extent of explosives at the 90mm Firing Point at 0 – 0.5 ft, composite soil samples will be collected from six grid locations surrounding the 44T and 44U grids. All samples will be analyzed for explosives (Method 8330).

A contingency of ten composite soil samples at ten grid locations is planned dependent on the results of the initial sampling.

Pesticides - Area 44 and the pesticide analytical results from previous sampling are summarized in Figure 2-5. Soil sampling around the 90mm Firing Point consisted of sampling two soil grids (44T and 44U) positioned on either side of the firing point. Soil samples were collected from 0 – 0.25 ft, 0.25 – 0.5 ft and 0.5 – 1.0 ft. Pesticide analytical results showed that dieldrin was detected in excess of the cleanup standard in the 0 – 0.25 ft sample at 44T (1800 ug/kg). To assess the horizontal extent of pesticides at the 44T location at 0 – 0.5 ft, composite soil samples collected from the three grid locations surrounding the 44T grid that are designated for the explosive analysis will also analyzed for pesticides (Method OLM03.1).

Metals - Area 44 and the explosive analytical results from previous sampling are summarized in Figure 2-6. Metals analytical results showed that copper and lead were detected. An agreed upon soil cleanup standard for the metals has not been reached at this time. Therefore, it is unclear whether the copper and lead levels exceed any cleanup standards. In the absence of a metals cleanup standard, metal samples will be collected at the same location as the explosive samples discussed in the proceeding section. The samples will be held for analysis pending the outcome of the soil cleanup standard discussions with the regulatory agencies. Metals have a six-month holding time for analysis.

2.3.4 Rocket Firing Point

Explosives - Area 44 and the explosive analytical results from previous sampling are summarized in Figure 2-4. Soil sampling around the Rocket Firing Point consisted of sampling four soil grids (44B, 44C, 44D, 44E) positioned around each side of the firing point. Samples were collected from 0 – 0.25 ft, 0.25 – 0.5 ft and 0.5 – 1.0 ft. Explosive analytical results showed that NG was detected in concentrations above cleanup standards in samples from one or more of the grids at 0 – 0.25 ft (4800 – 130,000 J ug/kg) and 0.25 – 0.5 ft (3700 J – 7200 J ug/kg). For the 0.5 – 1.0 ft samples, the cleanup standard was exceeded for NG at soil grids 44C and 44E (5600 J ug/kg and 3400 J ug/kg).

To assess the horizontal extent of explosives around the Rocket Firing Point at 0 – 0.5 ft, composite soil samples will be collected from 12 grid locations surrounding the 44B, 44C, 44D, and 44E grids. In addition, composite soil samples will be collected from 0.5 – 1.0 ft at the three grid locations surrounding each of the 44C and 44E grids to assess the horizontal extent of explosives at this depth. To assess the vertical extent of explosives, composite soil samples will be collected at 1.5 – 2 ft at grids 44C and 44E. All samples will be analyzed for explosives (Method 8330).

Metals - Area 44 and the explosive analytical results from previous sampling are summarized in Figure 2-6. Metals analytical results showed that copper and lead were detected. An agreed upon soil cleanup standard for the metals has not been reached at this time. Therefore, it is unclear whether the copper and lead levels exceed any cleanup standards. In the absence of a metals cleanup standard, metal samples will be collected at the same location as the explosive samples discussed in the proceeding section. The samples will be held for analysis pending the outcome of the soil cleanup standard discussions with the regulatory agencies. Metals have a six-month holding time for analysis.

2.3.5 Dragon Firing Point

Pesticides - Area 44 and the pesticide analytical results from previous sampling are summarized in Figure 2-5. Soil sampling around the Dragon Firing Point consisted of sampling two soil grids (44H and 44I) positioned on each side of the firing point. Soil samples were collected from 0 – 0.25 ft, 0.25 – 0.5 ft and 0.5 – 1.0 ft. Pesticide analytical results showed that dieldrin was detected in excess of the cleanup standard in the 0 – 0.25 ft sample at 44I (1200 ug/kg).

To assess the horizontal extent of pesticides at the 44I location at 0 – 0.5 ft, composite soil samples will be collected from same three grid locations surrounding the 44I grid and analyzed for pesticides (Method OLM03.1).

Metals - Area 44 and the explosive analytical results from previous sampling are summarized in Figure 2-6. Metals analytical results showed that copper and lead were detected. An agreed upon soil cleanup standard for the metals has not been reached at this time. Therefore, it is unclear whether the copper and lead levels exceed any cleanup standards. In the absence of a metals cleanup standard, metal samples will be collected at the same location as the explosive samples discussed in the proceeding section. The samples will be held for analysis pending the outcome of the soil cleanup standard discussions with the regulatory agencies. Metals have a six-month holding time for analysis.

2.4 Area APC

Explosives – The APC Area and the explosive analytical results from previous sampling are summarized in Figure 2-7. Soil sampling consisted of sampling three soil grids (APC2 – APC4) and five discrete sampling locations (APC11 through APC14) positioned around the APC. APC1 was a composite sample of APC11 through APC14. Samples were collected from 0 – 0.25 ft, 0.25 – 0.5 ft and 0.5 – 1.0 ft. Explosive analytical results showed that RDX was detected in concentrations above the cleanup standard of 120 ug/kg in samples from APC1, APC2, APC3, APC13, APC14, and APC15 between 0 – 0.5 ft (130 - 4300 ug/kg). For the 0.5 – 1.0 ft samples, the cleanup standard was exceeded for RDX at location APC1 (370 ug/kg) and soil grid APC3.

To assess the horizontal extent of explosives around the APC at 0 – 0.5 ft and 0.5 – 1.0 ft, composite soil samples will be collected from 5 grid locations surrounding the previous sampling locations and grids. To assess the vertical extent of explosives, a composite soil sample will be collected at 1.5 – 2 ft at location APC1 and grid APC2. All samples will be analyzed for explosives (Method 8330).

3.0 Sampling & Analysis Methods

Two soil sampling methods are proposed for delineating the horizontal and vertical extent of EDB, explosives, and pesticides in soil as part of the Rapid Response Action. Discrete samples are to be collected from locations in Area 2 and the J-3 Wetland. Composite samples will be collected from soil grids in the KD Range areas and at the APC area.

Sample collection will be consistent with MMR SOPs, modifications to the SOPs as detailed in the Action Plan for the Camp Edwards Impact Area Groundwater Quality Study (ETA,1997), the Ogden Health and Safety Guidelines, Attachment A: Field guide to High Explosives, and the ASTM Standard Guide for Composite Sampling and Field Subsampling for Environmental Waste Management Activities (October 31, 1996). Sampling locations and grids will be flagged for magnetic anomalies prior to sampling, and sampling points adjusted if necessary to avoid anomalies.

3.1 Discrete Soil Samples

Samples from AOC Area 2 will be collected following the VOC sampling protocol. Samples from the J-3 Wetland will be collected following the non-VOC sampling protocols

3.1.1 VOC Sampling Protocol

- The hand auger will be decontaminated in accordance with SOP "MMR TECH-036"and modifications (ETA, 1997).
- Soil will be initially excavated from each discrete sampling location or grid point using a decontaminated hand auger to reach the required sample depth.
- Once the required depth is reached, a small portion of soil at each location will be removed with the hand auger and placed into a sample container or plastic bag for headspace screening using an OVM. Headspace screening for VOCs will be completed for samples collected at discrete locations and for samples collected from grid points.
- For samples collected from grid points: the headspace screening will be completed after collecting all the screening samples for each grid point. The point which has the highest OVM reading will be selected as the location for collection of the discrete soil sample representative of the grid. If no above background readings are recorded for any point. The center (third) point will be selected as the default sampling location.
- At each required depth interval, soil samples shall be collected using an open barrel, disposable syringe.
- The syringe will be filled with approximately 5 grams of relatively undisturbed soil.
- The soil will be extruded into a tared, pre-preserved 40ml vial containing a stir bar, sodium bisulfate and distilled water. (These tared 40ml vials are prepared by the manufacturer). Three vials will be filled for each sample.
- In the event that a field screening technique (instrument reading, visual staining of the soil, or olfactory observation) indicates the presence of VOCs or hydrocarbons, note the observations or instrument readings in the field logs. The sample shall be recollected following receipt of the laboratory results that indicate volatiles exceeding 200ppb (indicating a high level volatile analysis).
- If the sample is collected for high level volatile analysis, the sampling procedure will be the same with the exception that the sample shall be extruded into a 40ml vial containing "Purge and Trap" grade methanol. (The 40ml vials preserved with methanol shall be supplied by the laboratory as needed).

3.1.2 Non-VOC Sampling Protocol

- The split barrel sampler will be decontaminated following the procedures outlined ~~in~~ SOP "MMR TECH-036" and modifications (ETA, 1997).
- The split barrel sampler will be hammered to the desired depth using the slide hammer.
- The sampler will be retracted from the hole and detached from the hammer.
- The core tip and hammer cap will be unscrewed from the split tube.
- The split tube will be opened and the soil sample will be transferred to a decontaminated stainless steel bowl for homogenization of the sample for explosive or pesticide analysis.
- The split barrel sampler will then be decontaminated prior to the collection of additional samples at greater depths or different locations.
- If refusal is encountered with the split barrel sampler, an attempt to collect the sample with a decontaminated hand auger will be made.
- The split barrel sampler will be used for the collection of laboratory samples only. If there is an interval in the boring that will not be laboratory analyzed, then that interval will be removed using a decontaminated hand auger.

3.2 Composite Soil Samples from Soil Grids

Soil grids will measure 22 x 22 feet and consist of five points. The configuration of the sampling points within the grid are illustrated in Figure 3-1. The grid point numbers are labeled 1 through 5 beginning with the top right corner and progressing right to left, top to bottom. The center point is number 3. The sampling intervals will be 0 - 0.5 ft, 0.5 – 1.0 ft, 1.0 – 1.5 ft, or 1.5 – 2.0 ft as specified in Section 2 and Table 2-1. Additional sampling will be dependent the initial sampling results and will be discussed with the USEPA and MADEP on a case by case basis.

The following protocol will be followed for sampling each of the five points in a grid:

- The split barrel sampler will be decontaminated following the procedures outlined in SOP "MMR TECH-036" and modifications (ETA, 1997).
- The split barrel sampler will be hammered to the desired depth using the slide hammer.
- The sampler will be retracted from the hole and detached from the hammer.
- The core tip and hammer cap will be unscrewed from the split tube.
- The split tube will be opened and samples will be transferred to a stainless steel bowl for preparation of composite samples.

- The split barrel sampler will be decontaminated prior to the collection of additional samples.
- If refusal is encountered with the split barrel sampler, an attempt to collect the sample with a hand auger will be made.
- The split barrel sampler will be used for the collection of laboratory samples only. If there is an interval in the boring that will not be laboratory analyzed, then that interval will be removed using a decontaminated hand auger.

After retrieval, each subsample will be placed into a stainless steel bowl and homogenized together with the other subsamples. Following the mixing process, the composite sample will be placed into the appropriate sample containers.

3.3 QA/QC Samples

Quality Assurance/Quality Control (QA/QC) samples will be collected as described in the QA/QC Plan (Ogden, 1999). Field duplicates will be collected at the rate of 10% of the field samples for each analysis (EDB, pesticides, and explosives). Trip blanks will be submitted at the rate one of per day per shipment of EDB samples. Field blanks will be submitted at the rate of one per sampling event per water source for EDB, pesticide, and explosive analyses. One equipment rinseate of water rinsed over the split barrel sampler and a stainless steel bowl will be collected per day and analyzed for all analysis suites requested for samples collected on that sampling day.

4.0 Sample Documentation, Preparation, and Analysis

4.1 Sample Documentation

Once a discrete or composite soil sample is collected, a description of the sample will be entered on a field sampling form. The description will consist of the color of the sample specified using the Munsell Color, a brief description of the soil type using the Unified Soil Classification System, and an assessment of moisture content. One general soil description is adequate as representative of all subsamples that comprise a single composite sample, unless extreme differences are observed. As required, the OVM reading obtained from headspace screening and the grid point from which the VOC sample is collected will also be entered on the field form.

The label on the sample container and the field form will be filled out with the following sample information:

- site name
- area name and number (field form only)
- EPA sample identification number
- Ogden sample identification number
- sample date
- sample time
- the initials of person collecting the sample
- analyses requested

The samples will be uniquely identified with an Ogden sample ID that contains a reference to the sample location and the sample depth. The following is an example of the sample ID:

HC44CA1AAA

HC	Indicates that the sample is a hand auger composite sample; HD will be used for discrete samples.
44	Indicates the sample area (44 is the KD Range, 23 is the J-3 Wetland, 02 is Area 2, APC is the APC area).
CA	Indicates the grid or location designation.
1	Denotes the subsample location number. 1 is used for a composite sample or a discrete sample not collected from a grid.
AA	Indicates the depth where the sample was collected. AA is 0 – 0.5 ft, BA is 0.5 – 1.0 ft, CA is 1.0 – 1.5 ft, DA is 1.5 – 2.0 ft.
A	Indicates the type of sample. A is the original field sample. D is a duplicate sample. E is an equipment rinseate. F is a field blank. T is a Trip Blank.

The EPA sample ID will be assigned by sample management personnel.

4.2 Sample Preparation

Once collected in the field, the sample containers will be secured with signed custody seals and placed into a sample cooler for temporary storage and transportation back to the field office. The cooler will be provided with sufficient ice to maintain an approximate temperature of 4°C. The cooler will be maintained in the custody of field personnel or maintained under lock and key until it can be delivered to sample management personnel or the field office.

Once in the field office, the sample will be logged in on the chain of custody form and placed into a refrigerator until the sample is prepared for shipment to the laboratory. Preparation for shipment will be conducted in accordance with Section 4 of the QA/QC Plan (Ogden, 1999)

Samples will be shipped overnight by courier to the laboratory within two days of sample collection.

4.3 Sample Analysis

Samples collected under the RRA Field Sampling Plan will be analyzed for VOCs, Pesticides and/or Explosives. For each of these analyses, the following analytical methods and sample containers will be required and specified on the chain-of-custody:

SOIL
EDB (Method 8021): three 40ml clear glass vials, vial containing a stir bar, sodium bisulfate and distilled water.
Explosives (Method 8330): one, 8oz amber glass bottle.
Pesticides (Method OLM03.1): one, 8oz amber glass bottle.
(samples collected for both explosive and pesticide analysis can be collected in one 8oz bottle).

WATER (QA/QC samples)
EDB (Method 8021): three 40ml clear glass vials, preserved with sodium thiosulfate
Explosives (Method 8330): two, 1L amber glass bottles.
Pesticides (Method OLM03.1): two, 1L amber glass bottles.

A turn-around-time of 5 days will be requested from the laboratory for all analyses. This will be specified on the chain-of-custody.

5.0 References

ETA, 1997. Action Plan for the Camp Edwards Groundwater Quality Study. Prepared for the National Guard Bureau, Arlington, VA. Engineering Technologies Associates, Inc., Elliot City, MD, 5/1997.

Ogden, 1999. Quality Assurance/Quality Control Plan Addendum of the Camp Edwards Impact Area Groundwater Quality Study. Prepared for the National Guard Bureau, Arlington VA, by Ogden Environmental and Energy Services, Westford MA, 04/14/99.

Ogden, 2000. Draft Rapid Response Action Workplan, Camp Edwards, Massachusetts Military Reservation and Draft Release Abatement Measure Plan. Prepared for the National Guard Bureau, Arlington VA, by Ogden Environmental and Energy Services, Westford MA, 2/29/00.

TABLE 2-1

RAPID RESPONSE ACTION
SOIL SAMPLING SUMMARY

Area	Sample Type	No. of Locations	Location IDs	Sample Depths	Total Samples	Analyses			Comments
						EDB	Expl	Pest	
Area 2	Discrete samples from 5-point grid	1	02J	0 – 0.5’	1	X			Resample at grid 02J
Area 2	Discrete samples from 5-point grid	4	TBD	0 – 0.5’	TBD	X			Contingency samples around grid 02J
J-3 Wetland	Discrete samples	1	23HA	0 – 0.5’	1		X		Sample location SE of 23H
J-3 Wetland	Discrete samples	1	23B	1.5 – 2.0’	1		X		Deeper sample from location 23B
J-3 Wetland	Discrete samples	2	TBD	TBD	TBD		X		Contingency samples around locations 23B and 23H
J-3 Wetland	Discrete samples	2	23IA, 23IB	0 – 0.5’	2			X	Sample locations south and east of 23I
J-3 Wetland	Discrete samples	1	23I	1.5 – 2.0’	1			X	Deeper sample from location 23I
KD Range Primary Target	Composite samples from 5-point grid	2	44LA, 44LB	0 – 0.5’	2		X		Grids around 44L grid
KD Range Primary Target	Composite samples from 5-point grid	6	44MA,44MB,44MC 44NA,44NB,44NC	0 – 0.5’ 0.5 – 1.0’	12		X		Grids around 44M, 44N grids
KD Range Primary Target	Composite samples from 5-point grid	1	44N	1.5 – 2.0’	1		X		Deeper sample from grid 44N
KD Range Primary Target	Composite samples from 5-point grid	9	TBD	TBD	TBD		X		Contingency samples around 44L, 44M, 44N grids
KD Range TOW Firing Point	Composite samples from 5-point grid	6	44FA,44FB,44FC 44GA,44GB,44GC	0 – 0.5’	6		X		Grids around 44F and 44G grids
KD Range TOW Firing Point	Composite samples from 5-point grid	10	TBD	TBD	TBD		X		Contingency samples around 44F and 44G grids
KD Range 90mm Firing Point	Composite samples from 5-point grid	3	44TA,44TB,44TC	0 – 0.5’	3		X	X	Grids around 44Tgrid
KD Range 90mm Firing Point	Composite samples from 5-point grid	3	44UA,44UB,44UC	0 – 0.5’	3		X		Grids around 44U grid

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SUBJECT: Field Sampling Plan for Supplemental Delin
Support Rapid Response Actions (EPA Docket N

Dear Mr. Borci and Mr. Pinaud:

Attached is the Field Sampling Plan (FSP) for Supplemental
proposed to determine the lateral and vertical extent of soil exca
the goals of source control in the Rapid Response Actions. T
proposed in Section 2.5.1 of the Draft Rapid Response Action
Abatement Measure Plan (dated 29 February 2000). The intent
FSP are to delineate the extent of soil excavation that will be re
sources of contamination from each Area of Concern identified in

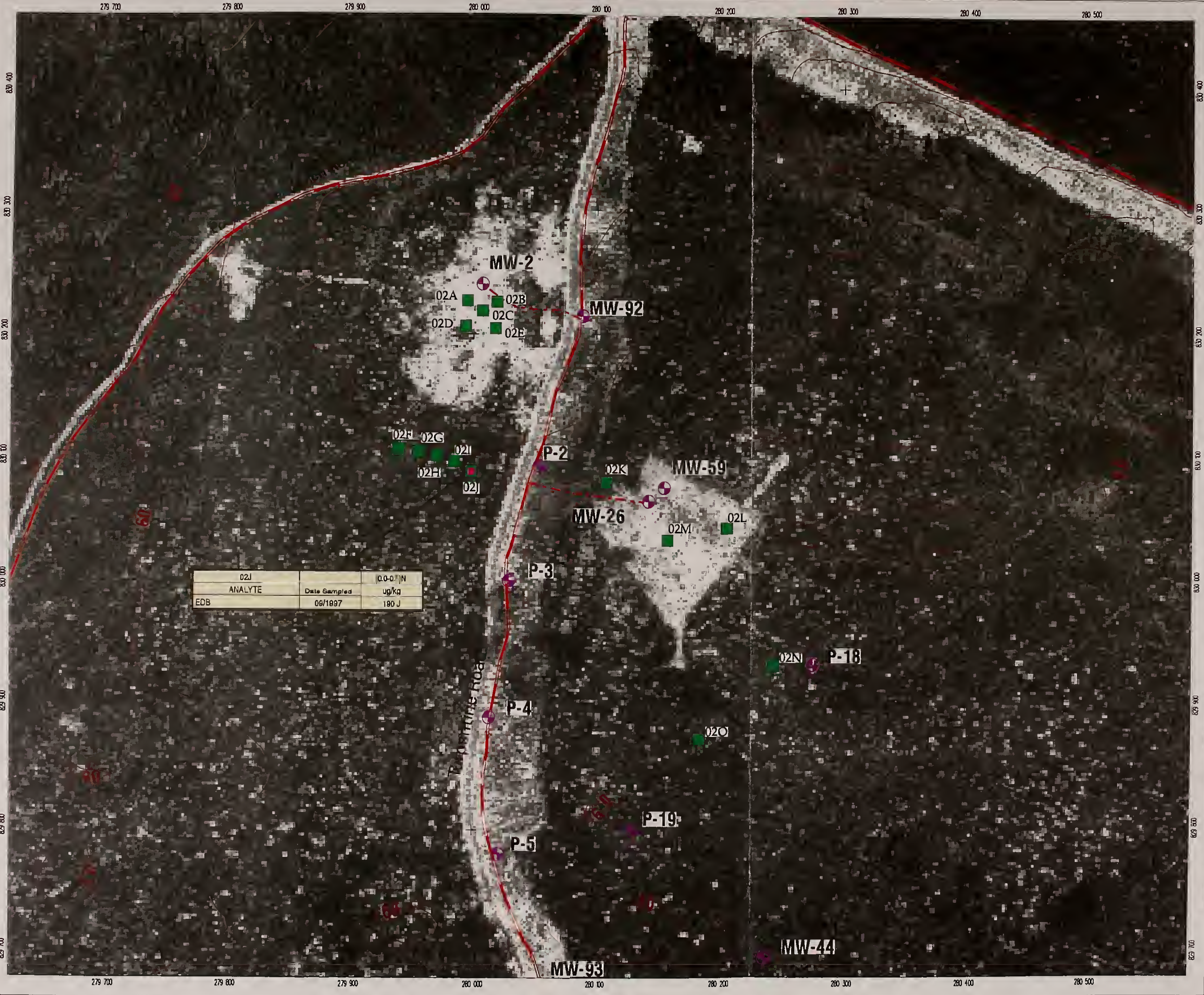
We request that USEPA and MADEP expedite their review of thi
discussion of the FSP during our next Technical Meeting (schedu
prepared to authorize Ogden to proceed with the collection of so
May 8, 2000 pending your acceptance of the FSP. This additiona
initiated on an expedited basis (i.e., in advance of USEPA/MADE
to secure the information necessary to implement the RRA field
AO enforceable milestone for source control of October 1, 2000.

TABLE 2-1 (continued)

RAPID RESPONSE ACTION
SOIL SAMPLING SUMMARY

Area	Sample Type	No. of Locations	Location IDs	Sample Depths	Total Samples	Analyses			Comments
						EDB	Expl	Pest	
KD Range 90mm Firing Point	Composite samples from 5-point grid	10	TBD	0 – 0.5’	TBD		X		Contingency samples around grids 44T and 44U
KD Range Rocket Firing Points	Composite samples from 5-point grid	6	44BA,44BB,44BC 44DA,44DB,44DC	0 – 0.5’	6		X		Grids around 44B and 44D
KD Range Rocket Firing Points	Composite samples from 5-point grid	6	44CA,44CB,44CC 44EA,44EB,44EC	0 – 0.5’ 1.5 – 2.0’	12		X		Grids around 44C and 44E
KD Range Dragon Firing Points	Composite samples from 5-point grid	3	44IA,44IB,44IC	0 – 0.5’	3			X	Grids around grid 44I
APC	Composite samples from 5-point grid	5	APC20-APC24	0 – 0.5’ 0.5 – 1.0’	10		X		Grids around grids APC2, APC3, and locations APC1, APC13, APC14, APC15
APC	Composite sample from 5-point grid	2	APC1, APC3	1.5 – 2.0’	2		X		Deeper samples at location APC1 and grid APC3

TBD – to be determined



02J		0.0-0.5 N
ANALYTE	Date Sampled	ug/kg
EDB	09/1997	190 J

MMR Groundwater Study

LEGEND

⊕	Groundwater Wells
🟩	Existing Soil Grids
🟥	Proposed Soil Grids
ug/kg	Micrograms Per Kilogram
J	Estimated Quantity
N	Normal Environmental Sample

IMAGE DATE: 1966
All sample depth measurements are in feet

BASEMAP LEGEND

—	Water Bodies
—	Roads
- - -	Paths
—	3 Meter Contours

LOCATION MAP

NOTES & SOURCES

Chemical database last queried on: Jan 25 10:20

Map coordinates: Stateplane, NAD83, Zone 4151, Meters

IMAGERY: 1:24000 digital black & white aerial photos (nonrectified);
Resolution: 2.13 meters; Date Flown: February 1966
Source: USGS

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

EDB IN SOIL SAMPLES

N

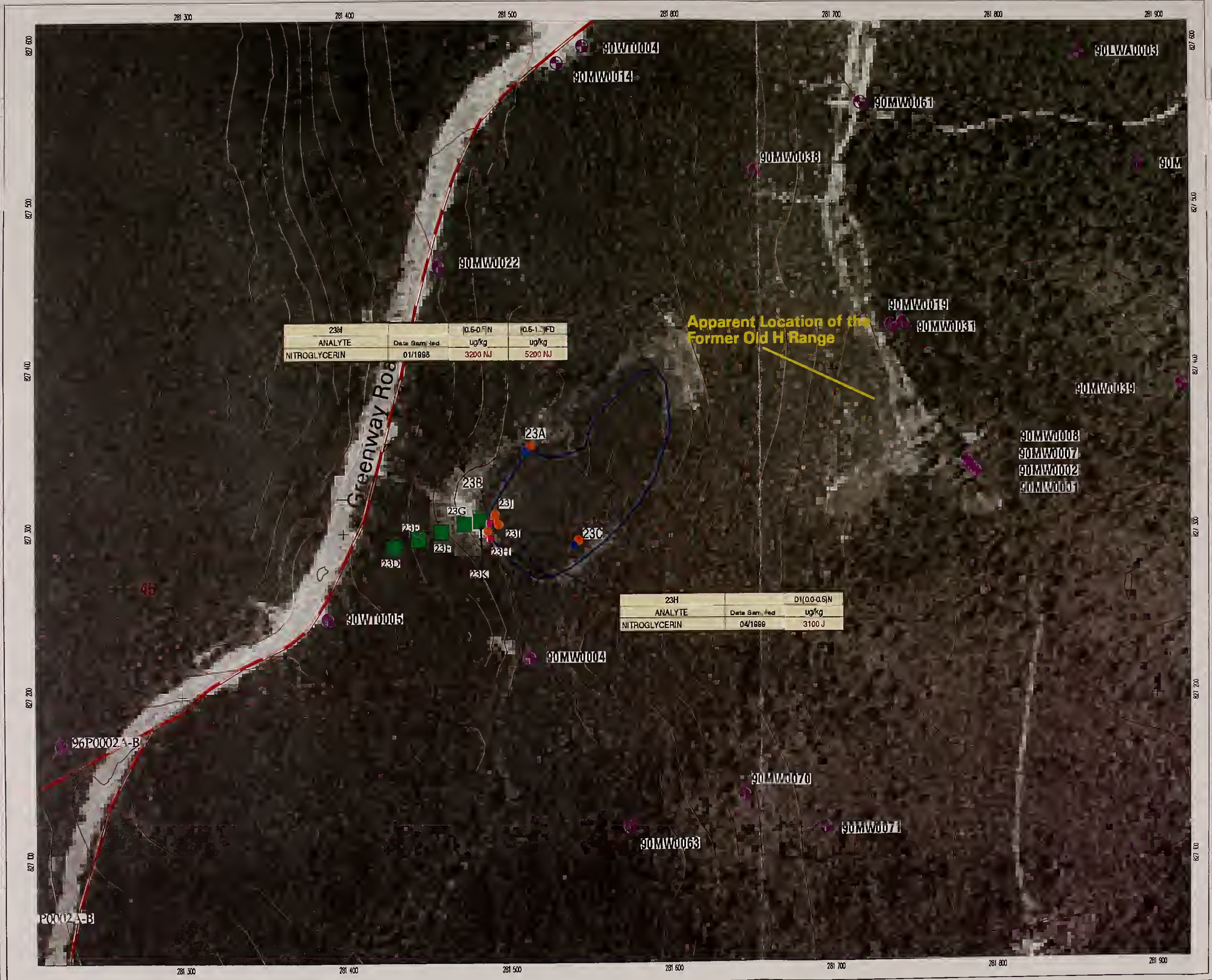
0 270
FEET
0 82
METERS

FIGURE

2-1

/oahu/mmrdata/mmr/spatial/ogden/amls/qd_mmr.aml map MMR23266_edit

DRAFT· 04/26/00



23H		(0.5-0.[illegible])N	(0.5-1.[illegible])FD
ANALYTE	Date Sampled	ug/kg	ug/kg
NITROGLYCERIN	01/1998	3200 NJ	5200 NJ

23H		D1(0.0-0.5)N
ANALYTE	Date Sampled	ug/kg
NITROGLYCERIN	04/1999	3100 J

MMR Groundwater Study

LEGEND

⊕	Groundwater Wells
●	Sediment Samples
●	Surface Water/Sediment Samples
🟩	Existing Soil Grids
■	Proposed Discrete Samples
ug/kg	Micrograms Per Kilogram
NJ	Tentatively Identified, Estimated Quantity
J	Estimated Quantity
FD	Field Duplicate
N	Normal Environmental Sample
D1	Discreet Sample Collected from Point 1

Concentrations of Surface Water Samples
Concentrations of Sediment Samples

IMAGE DATE: 1943
All sample depth measurements are in feet

BASEMAP LEGEND

—	Water Bodies
—	Roads
- · -	Paths
—	3 Meter Contours

LOCATION MAP

NOTES & SOURCES

Chemical database last queried on: Jan 25 10:20
Map coordinates: Stateplane, NAD83, Zone 4151, Meters

IMAGERY: 1:17200 digital black & white aerial photos;
Resolution: 2.95 meters; Date Flown: 1943; Source: National Archives & Records Service

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

NITROGLYCERIN IN J-3 WETLAND SAMPLES

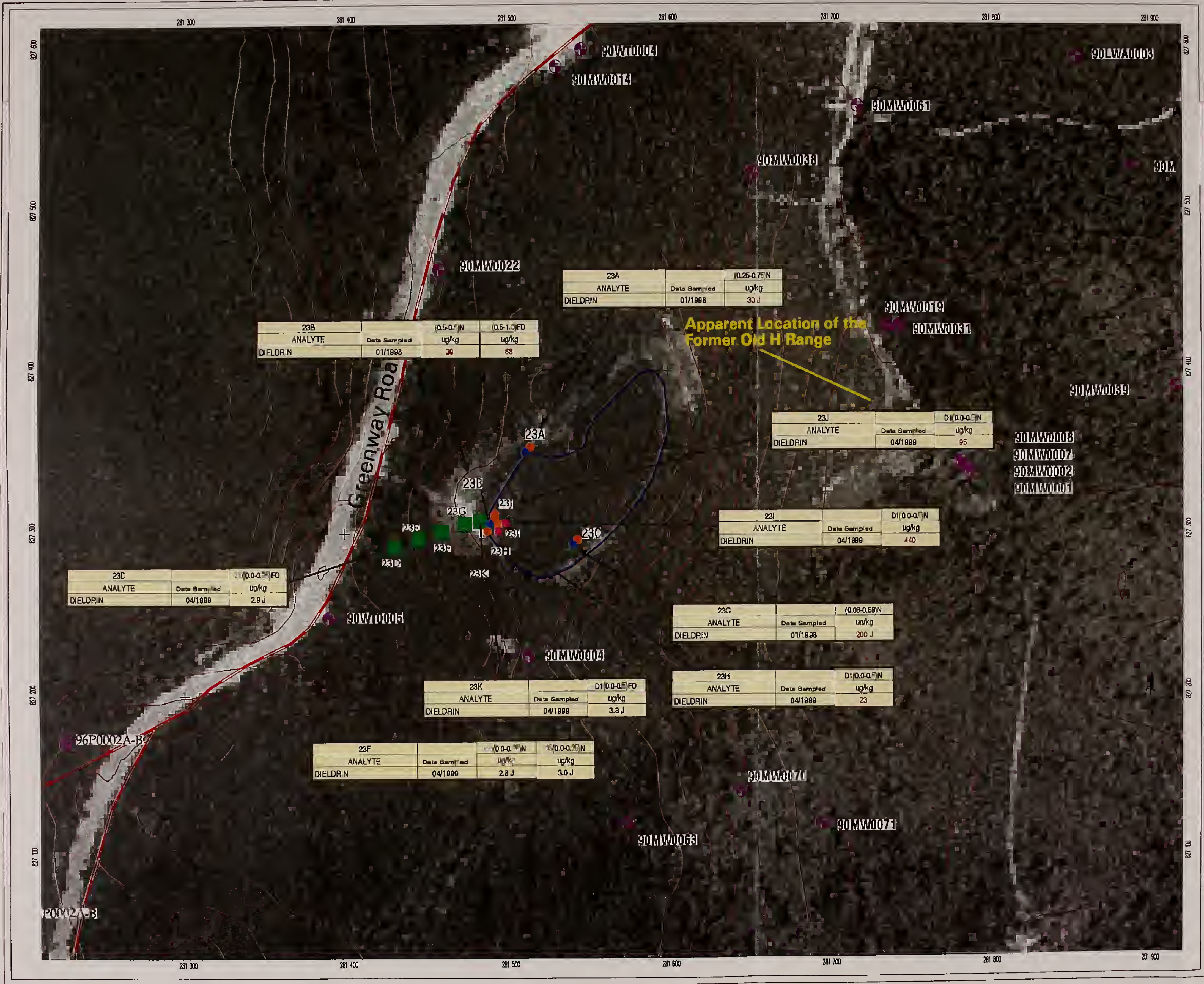
N

0 200
FEET
0 61
METERS

FIGURE
2-2

DRAFT 04/26/00

/oahu/mmrdata/mmr/spatial/ogden/amls/qd_mmr.aml map MMR231243_edit



23B		(0.5-0.7')N	(0.5-1.0')FD
ANALYTE	Date Sampled	ug/kg	ug/kg
DIELDRIN	01/1998	36	68

23A		(0.25-0.75')N
ANALYTE	Date Sampled	ug/kg
DIELDRIN	01/1998	30 J

23J		D1(0.0-0.5')N
ANALYTE	Date Sampled	ug/kg
DIELDRIN	04/1999	95

23I		D1(0.0-0.5')N
ANALYTE	Date Sampled	ug/kg
DIELDRIN	04/1999	440

23D		(0.0-0.25')FD
ANALYTE	Date Sampled	ug/kg
DIELDRIN	04/1999	2.9 J

23C		(0.08-0.58')N
ANALYTE	Date Sampled	ug/kg
DIELDRIN	01/1998	200 J

23K		D1(0.0-0.5')FD
ANALYTE	Date Sampled	ug/kg
DIELDRIN	04/1999	3.3 J

23H		D1(0.0-0.5')N
ANALYTE	Date Sampled	ug/kg
DIELDRIN	04/1999	23

23F		(0.0-0.25')N	(0.0-0.25')N
ANALYTE	Date Sampled	ug/kg	ug/kg
DIELDRIN	04/1999	2.8 J	3.0 J

MMR Groundwater Study

LEGEND

●	Groundwater Wells
●	Sediment Samples
●	Surface Water/Sediment Samples
🟩	Existing Soil Grids
▪	Proposed Discrete Samples
ug/kg	Micrograms Per Kilogram
J	Estimated Quantity
FD	Field Duplicate
N	Normal Environmental Sample
C0	Composite Sample
D1	Discreet Sample Collected from Point 1
D3	Discreet Sample Collected from Point 3

Concentrations of Surface Water Samples
Concentrations of Sediment Samples

IMAGE DATE: 1943
All sample depth measurements are in feet

BASEMAP LEGEND

—	Water Bodies
—	Roads
- · -	Paths
—	3 Meter Contours

LOCATION MAP

NOTES & SOURCES

Chemical database last queried on: Jan 25 10:20
Map coordinates: Stateplane, NAD83, Zone 4151, Meters

IMAGERY: 1:17200 digital black & white aerial photos;
Resolution: 2.95 meters; Date Flown: 1943; Source: National Archives & Records Service

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

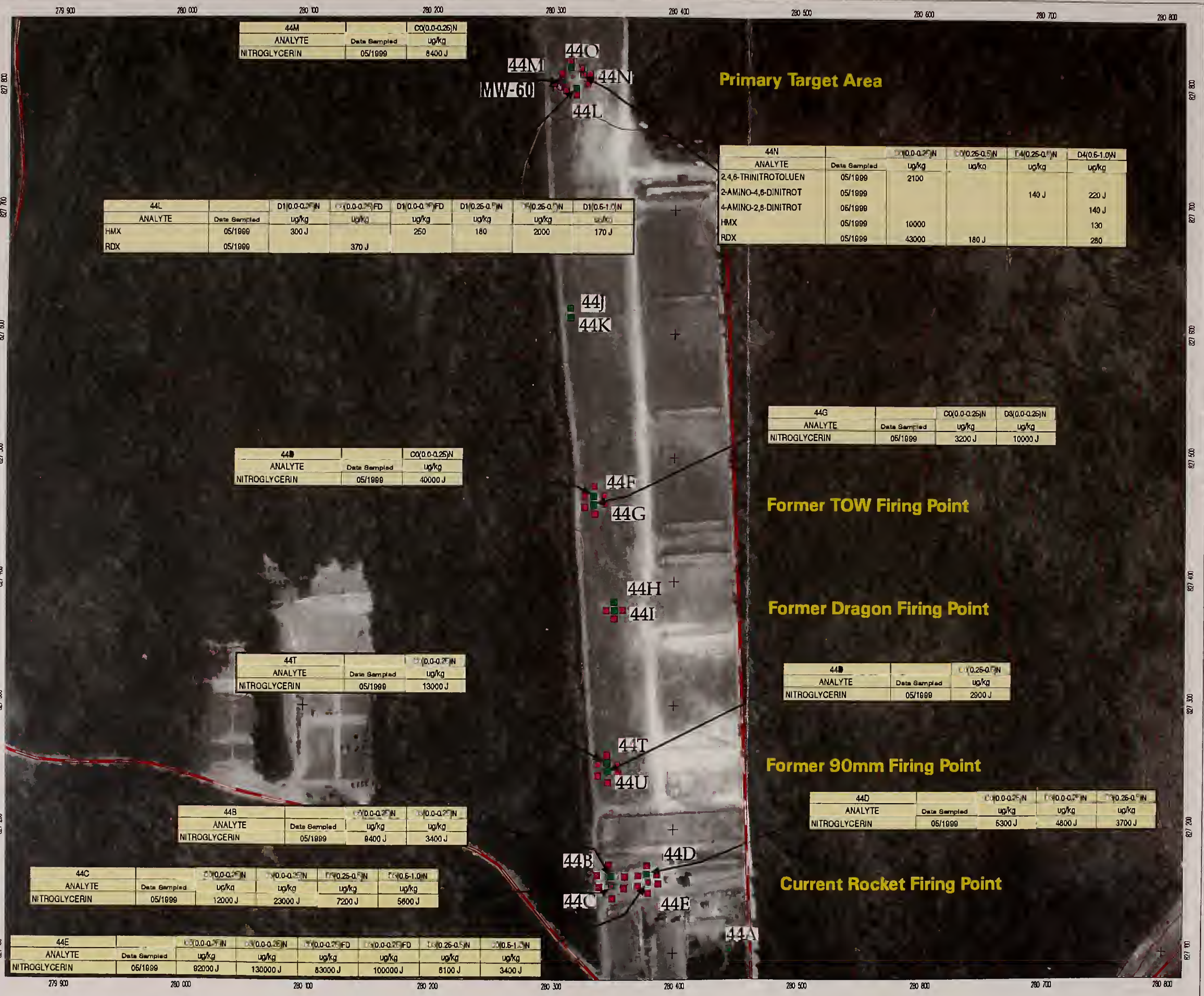
DIELDRIN IN J-3 WETLAND SAMPLES

0 200
FEET
0 61
METERS

FIGURE
2-3

DRAFT 04/26/00

/oahu/mmrdata/mmr/spatial/ogden/amls/qd_mmr.aml map MMR235243_edit



44M		C0(0.0-0.25)N
ANALYTE	Date Sampled	ug/kg
NITROGLYCERIN	05/1999	8400 J

44L		D1(0.0-0.25)N	[illegible](0.0-0.25)FD	D1(0.0-0.25)FD	D1(0.25-0.5)N	[illegible](0.25-0.5)N	D1(0.5-1.0)N
ANALYTE	Date Sampled	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
HMX	05/1999	300 J		250	180	2000	170 J
RDX	05/1999		370 J				

44N		[illegible](0.0-0.25)N	[illegible](0.25-0.5)N	D4(0.25-0.5)N	D4(0.5-1.0)N
ANALYTE	Date Sampled	ug/kg	ug/kg	ug/kg	ug/kg
2,4,6-TRINITROTOLUEN	05/1999	2100			
2-AMINO-4,6-DINITROT	05/1999			140 J	220 J
4-AMINO-2,6-DINITROT	05/1999				140 J
HMX	05/1999	10000			130
RDX	05/1999	43000	180 J		280

44G		C0(0.0-0.25)N	D3(0.0-0.25)N
ANALYTE	Date Sampled	ug/kg	ug/kg
NITROGLYCERIN	05/1999	3200 J	10000 J

44[illegible]		C0(0.0-0.25)N
ANALYTE	Date Sampled	ug/kg
NITROGLYCERIN	05/1999	40000 J

44T		[illegible](0.0-0.25)N
ANALYTE	Date Sampled	ug/kg
NITROGLYCERIN	05/1999	13000 J

44[illegible]		[illegible](0.25-0.5)N
ANALYTE	Date Sampled	ug/kg
NITROGLYCERIN	05/1999	2900 J

44B		[illegible](0.0-0.25)N	[illegible](0.0-0.25)N
ANALYTE	Date Sampled	ug/kg	ug/kg
NITROGLYCERIN	05/1999	9400 J	3400 J

44D		[illegible](0.0-0.25)N	[illegible](0.0-0.25)N	[illegible](0.25-0.5)N
ANALYTE	Date Sampled	ug/kg	ug/kg	ug/kg
NITROGLYCERIN	05/1999	5300 J	4800 J	3700 J

44C		[illegible](0.0-0.25)N	[illegible](0.0-0.25)N	[illegible](0.25-0.5)N	[illegible](0.5-1.0)N
ANALYTE	Date Sampled	ug/kg	ug/kg	ug/kg	ug/kg
NITROGLYCERIN	05/1999	12000 J	23000 J	7200 J	5600 J

44E		[illegible](0.0-0.25)N	[illegible](0.0-0.25)N	[illegible](0.0-0.25)FD	[illegible](0.0-0.25)FD	[illegible](0.25-0.5)N	[illegible](0.5-1.0)N
ANALYTE	Date Sampled	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
NITROGLYCERIN	05/1999	92000 J	130000 J	83000 J	100000 J	8100 J	3400 J

MMR Groundwater Study

LEGEND

KD Rocket Range

- ● Groundwater Wells
- 🟩 Existing Soil Grids
- 🟥 Proposed Soil Grids

ug/kg	Micrograms Per Kilogram
J	Estimated Quantity
FD	Field Duplicate
N	Normal Environmental Sample
C0	Composite Sample
D1	Discreet Sample Collected from Point 1
D3	Discreet Sample Collected from Point 3
D4	Discreet Sample Collected from Point 4
D5	Discreet Sample Collected from Point 5

SOIL GRIDS ARE NOT TO SCALE
IMAGE DATE: 1994
All sample depth measurements are in feet

BASEMAP LEGEND

- Water Bodies
- Roads
- Paths
- 3 Meter Contours

LOCATION MAP

NOTES & SOURCES

Map coordinates: Stateplane, NAD83, Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MASSGIS; Resolution: 1/2 meter; Date Flown: 1994

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

RDX, HMX, TNT, 2A-DNT, 4A-DNT AND NITROGLYCERIN IN SOIL SAMPLES

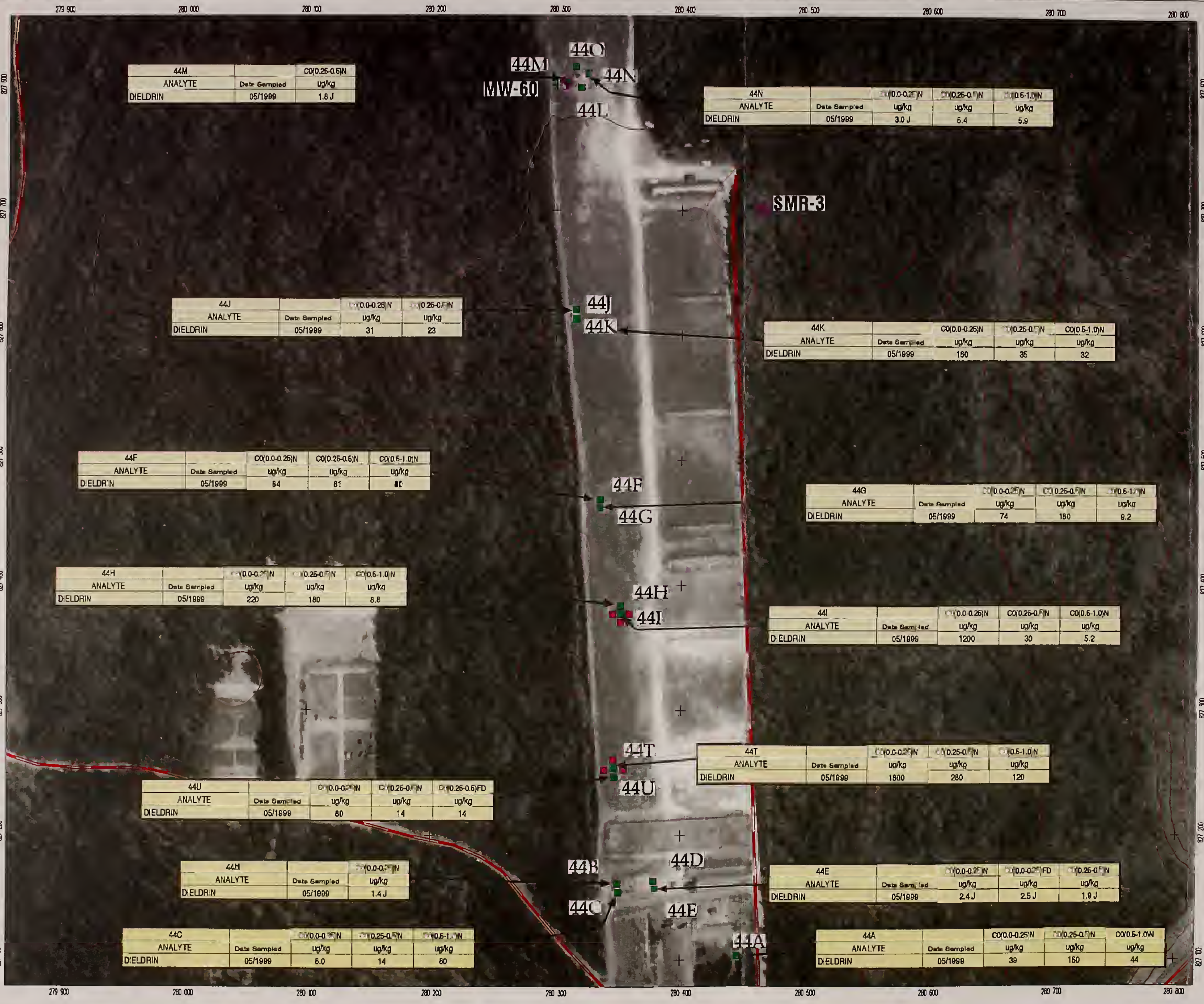
N

0 270
FEET
0 82
METERS

FIGURE
2-4

/oahu/mmrdata/mmr/spatial/ogden/amls/qd_mmr aml map MMR4412_edit

DRAFT 04/26/00



44M		C0(0.25-0.5)N
ANALYTE	Date Sampled	ug/kg
DIELDRIN	05/1999	1.8 J

44N		C0(0.0-0.25)N	C0(0.25-0.5)N	C0(0.5-1.0)N
ANALYTE	Date Sampled	ug/kg	ug/kg	ug/kg
DIELDRIN	05/1999	3.0 J	5.4	5.9

44J		C0(0.0-0.25)N	C0(0.25-0.5)N
ANALYTE	Date Sampled	ug/kg	ug/kg
DIELDRIN	05/1999	31	23

44K		C0(0.0-0.25)N	C0(0.25-0.5)N	C0(0.5-1.0)N
ANALYTE	Date Sampled	ug/kg	ug/kg	ug/kg
DIELDRIN	05/1999	160	35	32

44F		C0(0.0-0.25)N	C0(0.25-0.5)N	C0(0.5-1.0)N
ANALYTE	Date Sampled	ug/kg	ug/kg	ug/kg
DIELDRIN	05/1999	84	81	80

44G		C0(0.0-0.25)N	C0(0.25-0.5)N	C0(0.5-1.0)N
ANALYTE	Date Sampled	ug/kg	ug/kg	ug/kg
DIELDRIN	05/1999	74	180	8.2

44H		C0(0.0-0.25)N	C0(0.25-0.5)N	C0(0.5-1.0)N
ANALYTE	Date Sampled	ug/kg	ug/kg	ug/kg
DIELDRIN	05/1999	220	180	8.8

44I		C0(0.0-0.25)N	C0(0.25-0.5)N	C0(0.5-1.0)N
ANALYTE	Date Sampled	ug/kg	ug/kg	ug/kg
DIELDRIN	05/1999	1200	30	5.2

44T		C0(0.0-0.25)N	C0(0.25-0.5)N	C0(0.5-1.0)N
ANALYTE	Date Sampled	ug/kg	ug/kg	ug/kg
DIELDRIN	05/1999	1800	280	120

44U		C0(0.0-0.25)N	C0(0.25-0.5)N	C0(0.25-0.5)FD
ANALYTE	Date Sampled	ug/kg	ug/kg	ug/kg
DIELDRIN	05/1999	80	14	14

44N		C0(0.0-0.25)N
ANALYTE	Date Sampled	ug/kg
DIELDRIN	05/1999	1.4 J

44E		C0(0.0-0.25)N	C0(0.0-0.25)FD	C0(0.25-0.5)N
ANALYTE	Date Sampled	ug/kg	ug/kg	ug/kg
DIELDRIN	05/1999	2.4 J	2.5 J	1.9 J

44C		C0(0.0-0.25)N	C0(0.25-0.5)N	C0(0.5-1.0)N
ANALYTE	Date Sampled	ug/kg	ug/kg	ug/kg
DIELDRIN	05/1999	8.0	14	60

44A		C0(0.0-0.25)N	C0(0.25-0.5)N	C0(0.5-1.0)N
ANALYTE	Date Sampled	ug/kg	ug/kg	ug/kg
DIELDRIN	05/1999	39	150	44

MMR Groundwater Study

LEGEND

KD Rocket Range

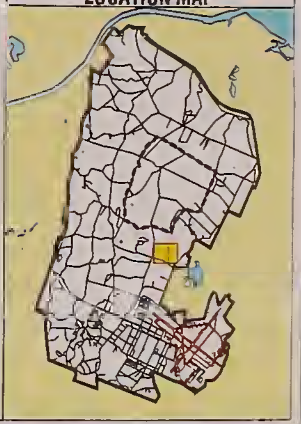
●	Groundwater Wells
🟩	Existing Soil Grids
🟥	Proposed Soil Grids
ug/kg	Micrograms Per Kilogram
J	Estimated Quantity
FD	Field Duplicate
N	Normal Environmental Sample
C0	Composite Sample

SOIL GRIDS ARE NOT TO SCALE
IMAGE DATE: 1994
All sample depth measurements are in feet

BASEMAP LEGEND

—	Water Bodies
—	Roads
- - -	Paths
—	3 Meter Contours

LOCATION MAP



NOTES & SOURCES

Map coordinates: Stateplane, NAD83, Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MASSGIS; Resolution: 1/2 meter; Date Flown: 1994

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

DIELDRIN IN SOIL SAMPLES

N

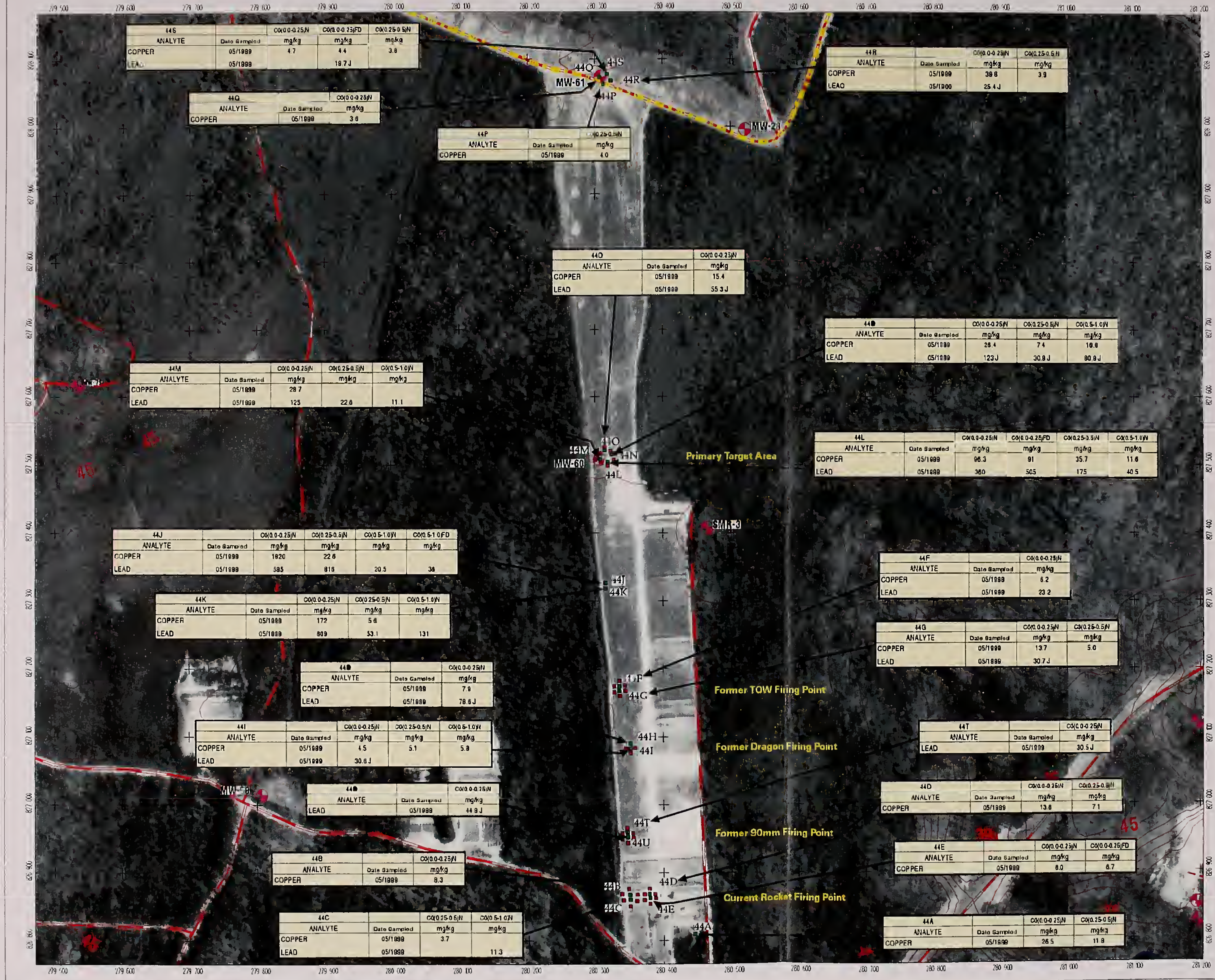
0 270
FEET
0 82
METERS

FIGURE

2-5

/oahu/mmrdata/mmr/spatial/ogden/amls/qd_mmr.aml map MMR4452_edit

DRAFT 04/26/00



44S		CO(0.0-0.25)N	CO(0.0-0.25)FD	CO(0.25-0.5)N
ANALYTE	Date Sampled	mg/kg	mg/kg	mg/kg
COPPER	05/1999	4.7	4.4	3.8
LEAD	05/1999		19.7 J	

44Q		CO(0.0-0.25)N
ANALYTE	Date Sampled	mg/kg
COPPER	05/1999	3.8

44P		CO(0.25-0.5)N
ANALYTE	Date Sampled	mg/kg
COPPER	05/1999	4.0

44R		CO(0.0-0.25)N	CO(0.25-0.5)N
ANALYTE	Date Sampled	mg/kg	mg/kg
COPPER	05/1999	39.6	3.9
LEAD	05/1999	25.4 J	

44O		CO(0.0-0.25)N
ANALYTE	Date Sampled	mg/kg
COPPER	05/1999	15.4
LEAD	05/1999	55.3 J

44[illegible]		CO(0.0-0.25)N	CO(0.25-0.5)N	CO(0.5-1.0)N
ANALYTE	Date Sampled	mg/kg	mg/kg	mg/kg
COPPER	05/1999	26.4	7.4	10.6
LEAD	05/1999	123 J	30.9 J	80.9 J

44M		CO(0.0-0.25)N	CO(0.25-0.5)N	CO(0.5-1.0)N
ANALYTE	Date Sampled	mg/kg	mg/kg	mg/kg
COPPER	05/1999	28.7		
LEAD	05/1999	125	22.6	11.1

44L		CO(0.0-0.25)N	CO(0.0-0.25)FD	CO(0.25-0.5)N	CO(0.5-1.0)N
ANALYTE	Date Sampled	mg/kg	mg/kg	mg/kg	mg/kg
COPPER	05/1999	96.3	91	35.7	11.6
LEAD	05/1999	360	505	175	40.5

44J		CO(0.0-0.25)N	CO(0.25-0.5)N	CO(0.5-1.0)N	CO(0.5-1.0)FD
ANALYTE	Date Sampled	mg/kg	mg/kg	mg/kg	mg/kg
COPPER	05/1999	1820	22.6		
LEAD	05/1999	585	816	20.5	36

44K		CO(0.0-0.25)N	CO(0.25-0.5)N	CO(0.5-1.0)N
ANALYTE	Date Sampled	mg/kg	mg/kg	mg/kg
COPPER	05/1999	172	5.6	
LEAD	05/1999	809	53.1	131

44F		CO(0.0-0.25)N
ANALYTE	Date Sampled	mg/kg
COPPER	05/1999	6.2
LEAD	05/1999	23.2

44G		CO(0.0-0.25)N	CO(0.25-0.5)N
ANALYTE	Date Sampled	mg/kg	mg/kg
COPPER	05/1999	13.7	5.0
LEAD	05/1999	30.7 J	

44[illegible]		CO(0.0-0.25)N
ANALYTE	Date Sampled	mg/kg
COPPER	05/1999	7.9
LEAD	05/1999	78.6 J

44I		CO(0.0-0.25)N	CO(0.25-0.5)N	CO(0.5-1.0)N
ANALYTE	Date Sampled	mg/kg	mg/kg	mg/kg
COPPER	05/1999	4.5	5.1	5.8
LEAD	05/1999	30.6 J		

44T		CO(0.0-0.25)N
ANALYTE	Date Sampled	mg/kg
LEAD	05/1999	30.5 J

44[illegible]		CO(0.0-0.25)N
ANALYTE	Date Sampled	mg/kg
LEAD	05/1999	44.9 J

44D		CO(0.0-0.25)N	CO(0.25-0.5)N
ANALYTE	Date Sampled	mg/kg	mg/kg
COPPER	05/1999	13.8	7.1

44B		CO(0.0-0.25)N
ANALYTE	Date Sampled	mg/kg
COPPER	05/1999	8.3

44E		CO(0.0-0.25)N	CO(0.0-0.25)FD
ANALYTE	Date Sampled	mg/kg	mg/kg
COPPER	05/1999	8.0	6.7

44C		CO(0.25-0.5)N	CO(0.5-1.0)N
ANALYTE	Date Sampled	mg/kg	mg/kg
COPPER	05/1999	3.7	
LEAD	05/1999		11.3

44A		CO(0.0-0.25)N	CO(0.25-0.5)N
ANALYTE	Date Sampled	mg/kg	mg/kg
COPPER	05/1999	26.5	11.8

MMR Groundwater Study

LEGEND

KD Rocket Range

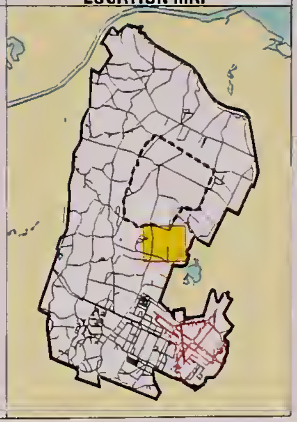
🟥	Groundwater Wells
🟩	Existing Soil Grids
■	Proposed Soil Grids
mg/kg	Milligrams Per Kilogram
J	Estimated Quantity
FD	Field Duplicate
N	Normal Environmental Sample
CO	Composite Sample

SOIL GRIDS ARE NOT TO SCALE
IMAGE DATE: 1994
All sample depth measurements are in feet

BASEMAP LEGEND

━	Water Bodies
━	Roads
╍	Paths
─	3 Meter Contours

LOCATION MAP



NOTES & SOURCES

Chemical database last queried on: Jan 25 10:20
Map coordinates: Stateplane, NAD83 Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MASSGIS; Resolution: 1/2 meter; Date Flown: 1994

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

COPPER AND LEAD IN SOIL SAMPLES

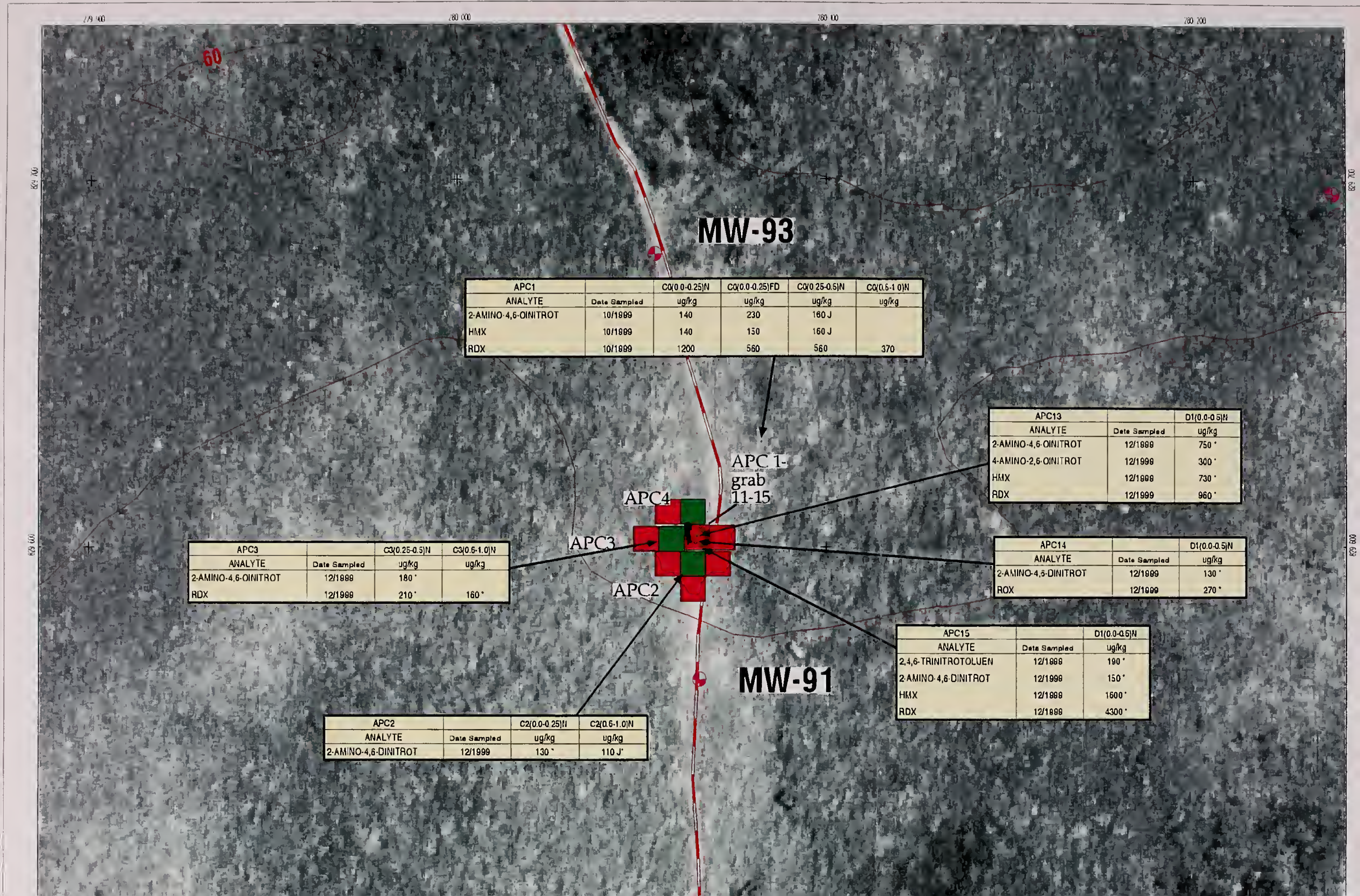
N

0 488
FEET
0 149
METERS

FIGURE
2-6

DRAFT 05/03/00

\ahu/mmrdata/mmr/spatial/ogden/amls/qd_mmr.aml map MMR4422_edit



APC1		C0(0.0-0.25)N	C0(0.0-0.25)FD	C0(0.25-0.5)N	C0(0.5-1.0)N
ANALYTE	Date Sampled	ug/kg	ug/kg	ug/kg	ug/kg
2-AMINO-4,6-DINITROT	10/1999	140	230	160 J	
HMX	10/1999	140	130	160 J	
RDX	10/1999	1200	560	560	370

APC13		D1(0.0-0.5)N
ANALYTE	Date Sampled	ug/kg
2-AMINO-4,6-DINITROT	12/1999	750 *
4-AMINO-2,6-DINITROT	12/1999	300 *
HMX	12/1999	730 *
RDX	12/1999	960 *

APC3		C3(0.25-0.5)N	C3(0.5-1.0)N
ANALYTE	Date Sampled	ug/kg	ug/kg
2-AMINO-4,6-DINITROT	12/1999	180 *	
RDX	12/1999	210 *	160 *

APC14		D1(0.0-0.5)N
ANALYTE	Date Sampled	ug/kg
2-AMINO-4,6-DINITROT	12/1999	130 *
RDX	12/1999	270 *

APC15		D1(0.0-0.5)N
ANALYTE	Date Sampled	ug/kg
2,4,6-TRINITROTOLUEN	12/1999	190 *
2-AMINO-4,6-DINITROT	12/1999	150 *
HMX	12/1999	1600 *
RDX	12/1999	4300 *

APC2		C2(0.0-0.25)N	C2(0.5-1.0)N
ANALYTE	Date Sampled	ug/kg	ug/kg
2-AMINO-4,6-DINITROT	12/1999	130 *	110 J*

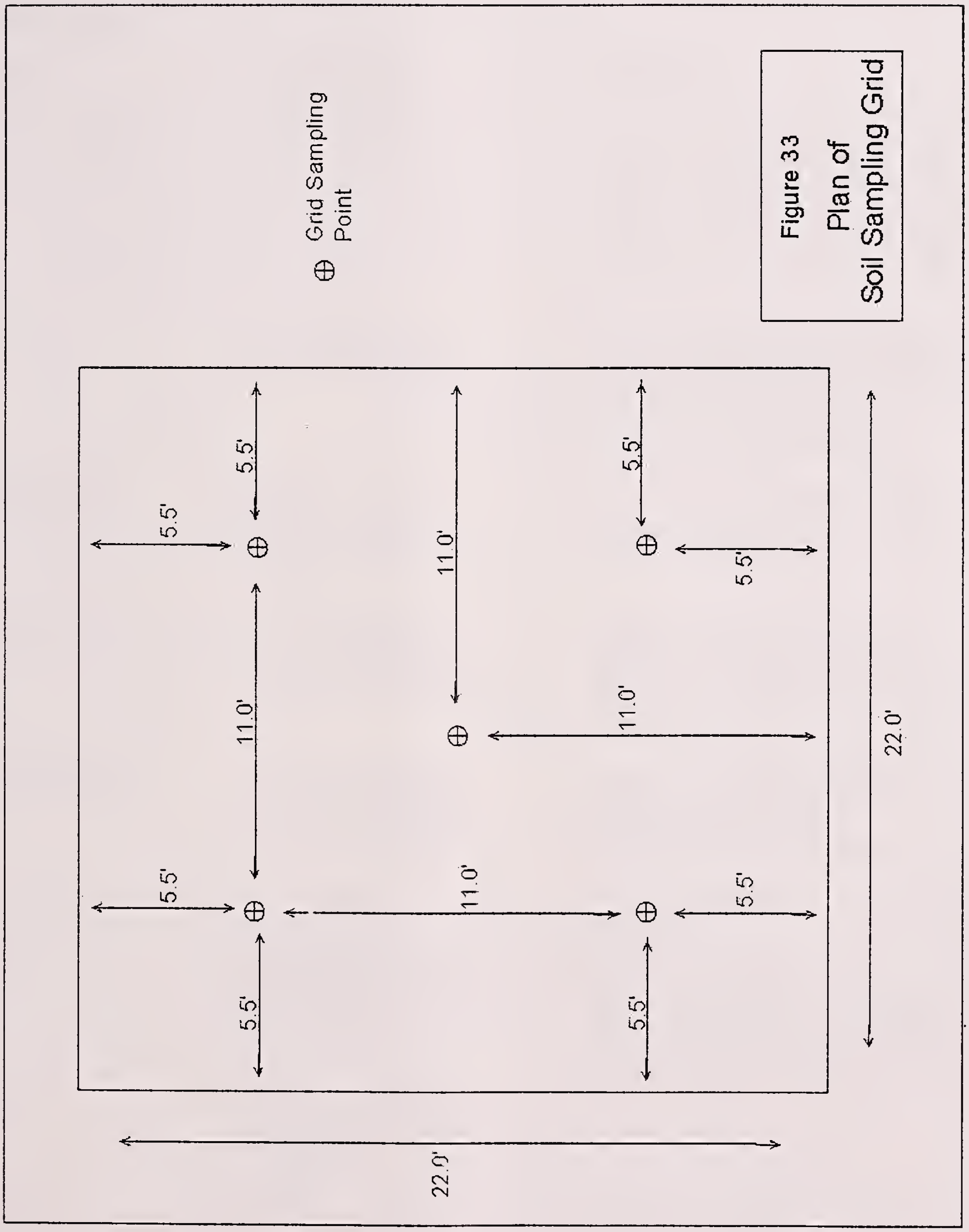


Figure 33
Plan of
Soil Sampling Grid

ATTACHMENT A: FIELD GUIDE TO HIGH EXPLOSIVES

Any substance encountered during sampling activities which differs in any way from natural media will be treated as a dangerous substance, carefully removed from the sample, and set aside.

EXPLOSIVES

NAME	DESCRIPTION	REMARKS
BLACK POWDER	BROWN TO BLACK	MANUFACTURED IN GRAINS THAT RANGE IN SIZE FROM SMALLER THAN SALT GRAINS TO GRAINS AS LARGE AS SMALL PEBBLES. HIGHLY SENSITIVE TO IGNITION BY HEAT, FRICTION, FLAME, SPARK. WHEN WET, IT IS CORROSIVE TO MOST METALS.
TNT	LIGHT YELLOW TO BROWN OR GRAY	LIGHTLY CORROSIVE WITH LEAD. USED IN BOMBS, GRENADES, DEMOLITION CHARGES, PROJECTILES. EXUDES AT ELEVATED TEMPERATURES. MODERATELY TOXIC BY SKIN ABSORPTION OR INHALATION.
EXPLOSIVE D	BRIGHT YELLOW TO ORANGE. ALSO CALLED AMMONIUM PICRATE.	RELATIVELY INSENSITIVE. HIGHLY TOXIC BY INHALATION, INGESTION, OR SKIN ABSORPTION
AMATOL	LIGHT BROWN TO YELLOW/MIXTURE OF TNT AND EXPLOSIVE D	SLIGHT HYGROSCOPIC. HAS CORROSIVE EFFECTS ON COPPER, BRONZE, LEAD, BRASS. HIGHLY TOXIC BY INHALATION, SKIN CONTACT, INGESTION.
COMPOSITION B	WHITE TO BROWNISH YELLOW, MIXTURE OF TNT AND EXPLOSIVE D	SLIGHTLY CORRODES COPPER, BRASS, CADMIUM, ZINC. USED IN BOMBS, PROJECTILES, GRENADES, SHAPED CHARGES.
OCTOL	LIGHT BROWN	USED IN BOMBS, PROJECTILES, SHAPED CHARGES.
RDX	WHITE. ALSO CALLED CYCLONITE	SENSITIVE TO IMPACT AND FRICTION.SLIGHTLY CORROSIVE WITH COPPER, BRASS, MILD STEEL, CADMIUM. MODERATELY TOXIC BY INHALATION OR INGESTION.
HMX	WHITE. ALSO CALLED OCTOGEN	SENSITIVE TO IMPACT AND FRICTION. SLIGHTLY TOXIC.
PETN	WHITE	SENSITIVE TO IMPACT. SLIGHTLY CORROSIVE TO BRASS, CADMIUM, ZINC. VERY SLIGHTLY TOXIC.

EXPLOSIVES, continued

NAME	DESCRIPTION	REMARKS
LEAD AZIDE	WHITE TO LIGHT BROWN	VERY SENSITIVE TO IMPACT, FRICTION, SPARKS. CORROSIVE TO COPPER, ZINC. VERY SLIGHTLY TOXIC.
LEAD STYPHNATE	LIGHT ORANGE TO REDDISH BROWN	SAME AS LEAD AZIDE.
MERCURY FULMINATE	GRAYISH	VERY SENSITIVE TO IMPACT, FRICTION, SPARKS. CORROSIVE TO ALUMINUM, MAGNESIUM, BRONZE, COPPER, ZINC, BRASS. HIGHLY TOXIC THROUGH SKIN ABSORPTION, INHALATION, INGESTION. SYMPTOMS RESEMBLE MERCURY POISONING.

PYROTECHNIC AGENTS USED AT MMR

SYMBOL	COMMON NAME	VISUAL IDENTIFICATION	ACTION
CS	NONE	WHITE CRYSTALLINE SOLID	TEAR AGENT
HC	HEXACHORO-ETHANE	WHITE SOLID	SCREENING SMOKE
WP	WHITE PHOSPHOROUS	PALE YELLOW SOLID	SCREEN SMOKE AND INCENDIARY
RP	RED PHOSPHOROUS	REDDISH BROWN POWDER	SCREENING SMOKE

OTHER COMPOUNDS

NAME	PROPERTIES	STABILITY
Picric Acid	lemon-yellow crystalline solid	very sensitive to blows or friction
Tetryl	fine yellow crystalline powder	sensitive to blows or friction
Composition A	unknown	unknown
Composition C3	unknown	unknown
Composition C4	unknown	unknown
Pentolite (50/50)	unknown	unknown
Tracer Compound	unknown	unknown
PBX	unknown	unknown
Ednatol	unknown	unknown
Tetrytol	unknown	unknown

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